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# Mantis Study Group Newsletter 15

**February 2000**

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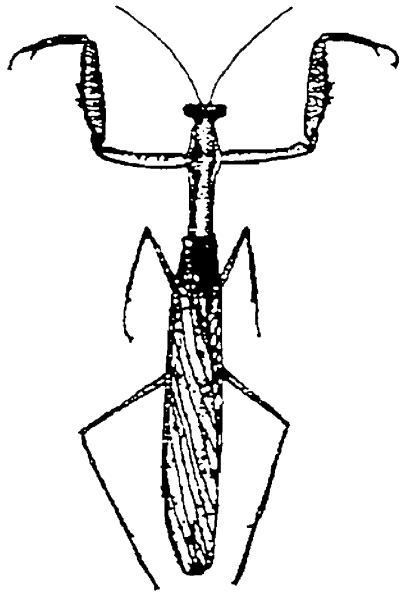


## Editorial

I have had a few phone calls over the past few months quizzing me about mantids. It seems the BBC are making a programme about mantids. Filming is due to start in February and the programme, part of the *Wildlife on One* series, will be broadcast sometime next year. I have asked for advance warning so that I can let members know when to expect the programme. Some MSG members may have been contacted to see if they can provide mantids for the filming, as usual with film makers, they want the more obscure species! If it is not obscure species they want then it is unusual colours or large quantities; some time ago someone phoned enquiring about where they could get about 50 pairs of adult mantids, all had to be green in colour. I did manage 2000 burrowing cockroaches for a film company a few years ago, but large quantities of mantids are a different proposition! The film company never did send me the promised video.

Thanks again to Kieren Pitts for helping with the abstracts section, and for printing and posting out the newsletters.

Paul Taylor is organising a joint MSG and PSG meeting on 18th June (see page 2) so make a note in your diary now.

## Membership — Paul Taylor.

To all members that have renewed their subscriptions, thank you. We have also had a lot of members join at the end of last year and into this year, with more new members joining most weeks. To you all: welcome to the Mantis Study Group.

Please remember that when the membership list is produced, you must not give out telephone numbers of any members to a third party.

Don't forget, all members of the MSG are entitled to a discount from Peregrine Livefoods on livefood purchases. You will need to give your MSG number with your order.

## Change of address

Josephine Wheat, our Livestock Co-ordinator has moved, her address now is:
11 Turnstone Drive, Leegomery, Telford, TF1 4WB.

Unfortunately Josephine has not been connected to a land phone yet, but she can be reached on her mobile during the evenings on 07718 449800.

## Web page — Paul Taylor.

I know I promised that our web page would be up and running, but unfortunately the person who was going to do it ran out of time. Fear not, for as the *MSG Newsletter* is going to press moves are being made to get the web page going, even if only on a temporary basis. A link will be made to the PSG Diary Dates page in order that members can be kept up to date with any events that are taking place.

## Exhibitions

We hope to be exhibiting at all of the following events but do not yet have anyone to run a stand at Oldham on 10th June (offers to Paul Taylor or Phil Bragg please).

**Sunday 16th April 2000.**

Midlands Entomological Fair. At Kettering Leisure Village. Open 1030-1630. Admission: £2.00 adults, £1.00 children and OAPs. The venue is just off junction 8 of the A14 and is usually well signposted.

**21st May 2000.**

British Tarantula Society Exhibition. At Wood Green High School, Wood Green Road, Wenesbury, near Birmingham - close to junction 9 of the M6. Open 1100-1700. Paul Taylor will not be able to attend this year so contact Phil Bragg for details or offers to help.

**10th June 2000.**

Creepy Crawly Show 2000. Queen Elizabeth Hall, Oldham. Open 1200-1700.

**10th June and 19th November 2000.**

Creepy Crawly Show, Newton Abbot Racecourse, Devon. Hopefully, more details later.

**18th June 1999.**

Mantis Study Group & Phasmid Study Group joint meeting and show. Birmingham Nature Centre, Cannon Hill Park, Pershore Road, Birmingham. This event is a public event promoted both by the PSG, MSG, but also other organizations and Birmingham City Council. More details in the next newsletter. If you are able to assist on the day with displays and promotional material please contact Paul Taylor or Phil Bragg nearer the time.

## The orchid mantis *Hymenopus coronatus*, part II — Francesco Tomasinelli.

(With drawings by Andrea Mangoni)

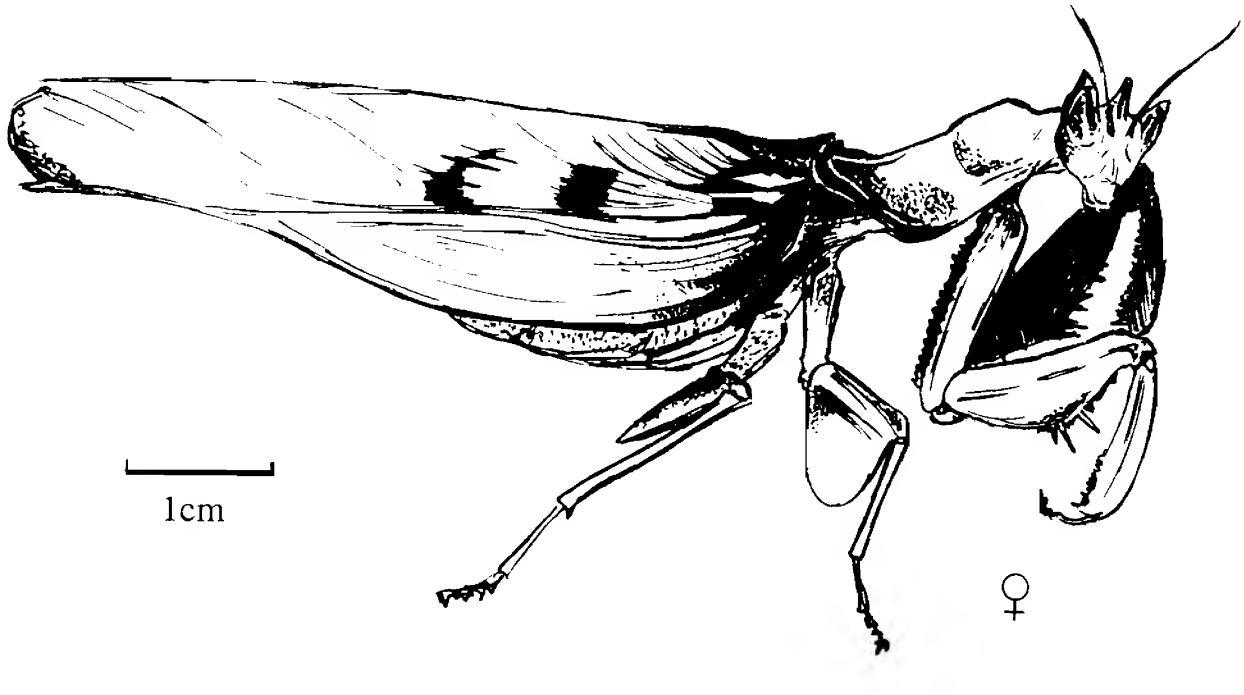
Previously (MSG Newsletter 13: 3-5) I reported on the nymphs and mimicry of *Hymenopus*. This time I will turn my attention to adult specimens and reproduction.

The last moult takes a considerable time, especially for females. A great amount of energy is spent for the production of those big white wings. The male matures faster and starts to display a slightly different coloration and big wingbuds the moult before adulthood. The pink pattern starts to turn brown but you should have determined sexes a while ago by counting abdominal segments after the second or third moult (6 for females, 8 for males, remember to check this on well fed mantids only). As nymphs mature, males feature a slightly different coloration (more brown, less pink).

Females take about four or five months to reach adult while males take about three and a half. It must be said that growing rate can vary a lot, depending on temperature and feeding. Sometimes mantids mature in very different times without any apparent reason.

One of the most impressive features of this orchid mantis in the adult stage is sexual dimorphism; the male is in fact very different in size and colouration. First of all it's only

3cm long, almost half of the female size. It loses part of the white-pink coloration, turning to beige-brown in the proximity of the joints and body extremities. It remains quite active and nervous, with a good disposition to fly.




Females are about 6cm long, with very big wings surpassing the abdomen by more than 1cm. Other cryptic adaptations are maintained, even if colours start to fade a little and wing sides become brown after some time. The nymphs are certainly more spectacular and many find adults a disappointment. Adult specimens display a reduced ability to jump but can both fly, even if they need ideal take-off conditions.

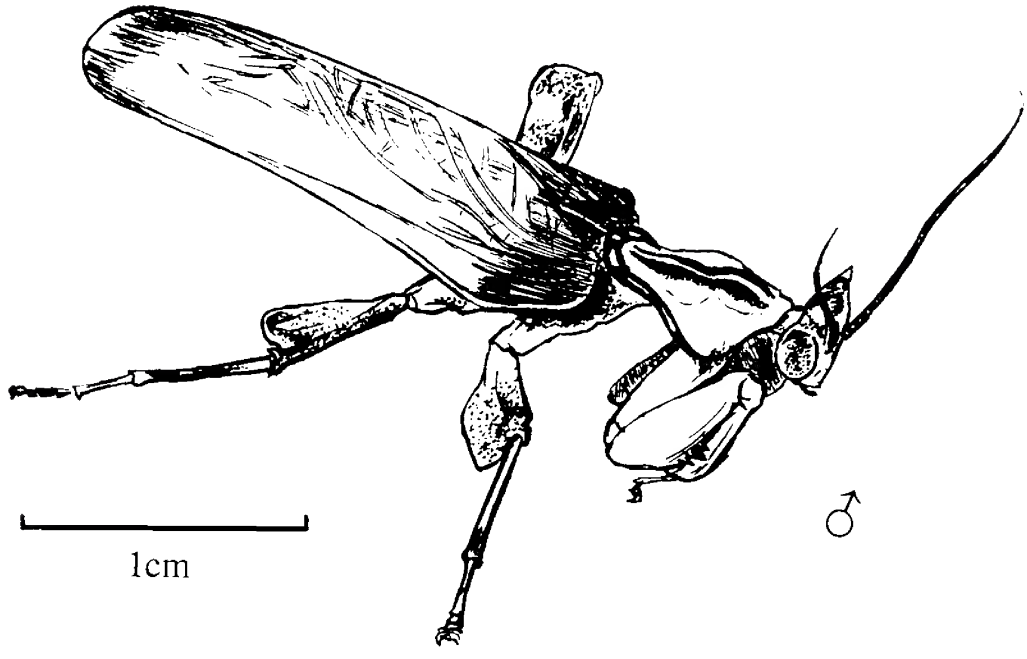
I have seen that adult *Hymenopus* are not great feeders. They seem to prefer flying prey and need prey variation to thrive. Mealworms are particularly good, but usually this mantis won't take them. You should give them with tweezers to make them move or simply put a wounded worm in the specimen's mouth. Well fed flies and butterflies are probably one of the best choices.

The difference between male and female maturation makes *Hymenopus* difficult to breed. Sometimes the males will be dead or useless at the time the female is ready. It's better to try to slow male's growth while speeding up the female's. Usually you should feed males less and keep them in a cooler environment.

Another alternative is to get hold of two different batches of animals: ideally they should be spaced one or two moults. If you are lucky enough to find the animals at these different stages you should end up having mature males and females at the same time.

Two weeks after adulthood mating can be tried. You can put the animals in two adjacent terrariums and see their reaction to understand if they are ready. The male should show interest soon. It is safer to introduce the female into the male's cage, this way the smaller male will see the female first and choose his strategy. I think ideal size should be 30cm x 20cm x 20cm, with branches and some leaves to provide some shelter to an escaping male. Of course remember to feed them a lot. As soon as the male sees his mate, he should soon start a courtship display employing the raptorial legs. Females are not usually aggressive toward their partners, but you should always be cautious. You can feed the female

while the male is close to her to give him a better chance. He climbs slowly on the female's back as for other species, but here size differences make the event quite curious.




After some weeks the female produces an egg case. This delay can vary a lot, from two to eight weeks, maybe more. In my experience the egg case is small and thin and should be suspended upside down in a small terrarium. According to other sources it can be quite big and contain up to 100 nymphs. Remember to provide ideal conditions to the egg case, especially humidity. Ventilation is important also, otherwise you will lose eggs to fungi. Hatching takes about two months (still depending on environmental conditions) and about 20 nymphs emerge. They are about 5mm body length with orange-red and black coloration as mentioned in the previous article.

Males live for about two or three months as adults, but sometimes females can last a year or more (for a complete life span). A friend of mine had a female which lived for fourteen months.

*Hymenopus* are not common on the pet market and most of the time they should be booked since they are very sought after. They are very expensive also. It's possible to obtain them as nymphs from various dealers, mainly in England and Germany.

## **Mantis 99** — Andy Lasbeny.

Here is the last-but-one mantis season of the century, and the approximate end of the first 100 years of mantids existing in New Jersey. Once again, to those more familiar with the common names, the Chinese mantis is *Tenodera aridifolia sinensis*, the narrow-winged mantis is *Tenodera angustipennis*, and the European mantis is *Mantis religiosa*. Mantis season 1999 has been quite good, with over 30 individuals of *Mantis religiosa* found in the usual places on the sides of buildings. The first adults were on July 29th, the same day as 1997. The "hot spot" for *Mantis religiosa* this year was the shopping centre just outside of town on one of the highways. *Tenodera aridifolia sinensis* were full grown in the wild right

on time, starting on August 12th, only nine weeks from the day of hatching, June 7th. *Tenodera angustipennis* began to appear in the beginning of September, and I found four adult males. By the middle and end of September, very few sightings occurred, except on vegetation, in the same spots that *Tenodera aridifolia sinensis* are usually seen year after year in my town. The drought we had all summer had a noticeable effect on *Mantis religiosa* - most of them are various shades of brown, tan and yellow - there are few green ones. Most years, there are more green ones than brown ones. However, there were more green *Tenodera aridifolia sinensis* this year than usual, so that does not make any sense in relation to the drought, though the drought was not as severe near the coast, and that is where most of those are. I will just give a brief summary of August 1999 mantis sightings, then go on to other topics.

On July 29th, 1999, I saw the first adult *Mantis religiosa* female, on the sidewalk near a store in the downtown area of the town I work in. But her abdomen is injured and she is weak. On the other side of the building, I can see a brown male, way too high to reach.

On August 2nd, I found a brown male *Mantis religiosa* on the wall of a store in that town at about 0800, only a few metres away from where the one was before. After work, I drove to the shopping centre right on the highway near the circle outside of town and saw four more of these - a green male, (too high, just out of reach), a brown female, (also too high), and two more brown females, under window sills. I got both of those.

Well, I went back to the shopping centre the following morning, and that brown female was still in the exact same spot. This time, I reached her with a long stick, and took her home. On the morning of August 4th, I spotted a similar female as I drove by the bank on the corner of Main Street and another major street that runs through town. I drove into the nearby parking lot, and took her too. She was on the side of the building under a ledge. A closer look showed that she was yellow, not brown or tan. During lunch, I saw a brown male, way out of reach on the soffit of a video store on Main Street. I will check tomorrow if he is still there.

Today, August 5th, I found another brown female on my way home. I saw it on a window sill of a store on one of the highways I take to go home as I was waiting to pull out onto the road. The male I saw yesterday is gone.

It is the week of August 9th, and I have a week of vacation, so I will miss a whole week's worth of sightings. I came back from a short trip to southern New Jersey on August 12, and two female *Tenodera aridifolia sinensis* in my garden were adults - in only nine weeks. These are from the egg cases I put in the garden in the spring, that hatched on June 7th.

On Monday, August 15th, I went back to work, and saw two green female *Mantis religiosa* in that same shopping centre on the highway outside of town, but both were too high to reach. Early the next morning, August 16th, I went back, and one was still there - I got her, and nearby, on the wall of a store was a brown male. I got that one too. Further down, was a brown female, low down on the wall, so I got her. I drove to the downtown area, and went to a bank on Main Street, but not the same one that I found a mantis on last week. There, on the concrete column that holds up the canopy, was another brown male *Mantis religiosa*. I walked around to the other side of the stores by the ice cream parlour, and on the window was a large brown female *Tenodera aridifolia sinensis*. Might as well take her too. Finally, during lunch, I found another brown male *M. religiosa* on the wall of an old run down house near my office.

This morning, August 18th, I drove again to the shopping centre I went to the other

times, again. On a column by one of the stores on the corner of the building nearest to the highway, I found a brown female *Mantis religiosa*, and a brown male about 3m away on a window frame. Another brown male was further down along the wall of another nearby store. I drove out of there to go into town. I parked at the office parking deck, and as I walked toward the door, a brown female was under a concrete projection a few metres above the ground near the entrance to the building I work in, the same general area I find at least a few each year. During lunch, I walked by the supermarket and saw a brown male *Tenodera aridifolia sinensis* high up on the window. I could not reach him, so I left him there. A few minutes later, I found a brown male *Mantis religiosa* under the aluminum window frame near a donut shop. On the way home , as I waited to get onto the highway, I glanced to the right, and on the same store window frame that I found the brown female on August 5th, was a green female *Mantis religiosa*. A few metres on either side of her were three more brown males. I got all of them - 9 in one day.

August 20th - I found two more brown female *Mantis religiosa* - one in the morning on the wall of the restaurant on the corner across the street from my office, (I saw that one as I drove by) and one during lunch across the street from the bank on which I found the yellow one on August 4th.

August 25th - I found some more *Mantis religiosa* - a green female on the ground yesterday morning at the shopping centre outside of town, (again!) and three males today - a green one at that place, and two brown ones near my office. I now have 25.

On September 3rd, I found a green male *Mantis religiosa* on a wall of that same shopping centre again, and a brown male on the column of the downtown stores. That was Friday, and the long weekend is coming, with a week of vacation. I found two more males of this species, one brown and one green, on September 5th, but these were close to home, about a 10 or 15 minute drive from the coast at a shopping centre on a highway there, on the wall of a food market, and another on the wall of a theatre. At least here, I can imagine where they are coming from, since there are fields of vegetation of the type that mantids can be found in no more than 150m away. The shopping centre that had all those *Mantis religiosa* is 1km from the nearest meadow of the type that mantids might be in. Also, that shopping centre faces away from the meadow, and is quite a bit uphill from it, so I do not know how the mantids even see these lights at night, and why do they fly that far to come here? I drove around the area and walked around, and saw no other possible places that these mantids could have come from. There are few houses with suitable gardens anywhere nearby, and everything around is a sea of pavement, with all the highways and shopping centres. What is also interesting, is that this is the only species of mantis that I ever see in this area, and by far the most commonly seen large insect of any kind. Very few other large insects seem to come to these storefronts. Most are small moths and flies, with an occasional grasshopper. Only on one occasion did I find another large insect - this was a Polyphemus moth, a very large and colourful giant silk moth with a 15cm wingspan. It was on the wall under the canopy in mid August. Why all these mantids come here I do not know. The downtown area has a lot more variety of insects there, and all three mantis species. The place the mantids are probably coming from to this area are meadows that are at least 0.4km from where I find the mantids, but still closer than the meadow at the other place. Near the stores on which I find the mantids is a large parking lot. More than 150m away is a road. Across the road are the railroad tracks and train station. Beyond that is another large parking lot, similar in size to the other one. Then, finally, on the far end of this are woods and meadows, actually more like empty lots with weeds. This is probably where they are coming

from, but if I go there and look, I do not see any mantids on the vegetation, or even near the train station. There are also no egg cases visible in winter, so I do not have a clear explanation for why all these mantids come into town, and where they come from. Similar areas in other parts of New Jersey, and even a few kilometres from there, do not necessarily have this many mantids coming to the storefronts, even when there are more nearby meadows.

*Gonatista grisea*

I went to Florida on the 7th of September. This is exactly the same place I went to in September 1997, Sanibel Island near Fort Meyers on the Gulf coast. I looked for mantids everywhere - on the walls of stores and hotels like I do in New Jersey, on vegetation along roadsides, in gardens, and even in a pristine cypress swamp. Mostly what I saw were numerous Cuban treefrogs, anoles, geckoes, but very few large insects, except for grasshoppers. I found three large lubber grasshoppers by our hotel room. On several nights I went to the hotel that I stayed in two years ago in order to look for creatures. I walked all around the lighted areas of the hotel, and saw mostly treefrogs and geckoes. Most of the insects were small moths, a few small beetles, flies, and some roaches. Finally, on the night of September 12th, at about 2330, I spotted an insect on one of the square, stucco covered columns on the ground floor of the hotel - it was a flat, broad gray coloured mantis - a bark mantis found only in the south eastern USA called *Gonatista grisea*, or grizzled mantis. This mantis quickly darted up and down, and side to side as I approached him and tried to catch him. He was very quick, and ran in quick, jerky motions, stopping suddenly and pressing himself against the column each time he stopped. Finally, I caught him and brought him back to my hotel room. He is a male, about 5cm long, and is shaped somewhat like a roach. The colour on top is silvery gray, with mottled darker gray and black markings on the wings and body. Underneath, there are areas of orange-brown, with dark gray markings. His antennae are very long. The following morning, I go outside to find some food, and give him a tiny grasshopper, which he eventually eats. I come back home on September 14, and bring him in with the rest of the mantids. His behaviour and movements are quite different from the other mantids. When I put him on a branch taken from a birch tree, he presses himself against it and literally disappears. The perfection of the camouflage is helped by the fact that the thickened area along the outer edge of his wings, the part that shows as a green stripe on the Chinese mantis, is transparent, so that you can see the bark of the branch right through this part, and he flattens himself against the bark, eliminating almost all shadows. His hind wings are transparent. He positions his forelegs differently as well. They are folded and held more outward toward either side, rather than down under his head, bringing him closer to the branch. He is not a particularly good eater, and seems to only want flies and moths. He eats crickets only occasionally, and only those that are very small.

What is most ironic is that after a week of searching in Florida, all I could find was that one mantis, but the day after I came back to work, I found three mantids in the town I work in, all in a 15 minute walk to the bank, without even trying. One was a male *Tenodera aridifolia sinensis*, the other two male *Tenodera angustipennis*. I could only reach one though, and I took him home. The following day I found two more male *Tenodera angustipennis*, both on the walls of stores in the downtown area. Two days later, another male *T. angustipennis* was in the same general area. By now, no more *Mantis religiosa* are coming to the buildings. The one month "window of opportunity" to get this species is now over. I am assuming that is why I did not see a lot of mantids in Florida - that there also is a one month period of intense mantis activity, but that it must happen much earlier, maybe

in July. Asking people in Florida when this time is was of no help. No one seems to know, not even a reptile and invertebrate dealer that lives near the area that I was in. They apparently never noticed or paid any attention to when that time of year actually occurs, and did not seem to even be aware that anything other than "typical green mantids" are living there.

The little mantis from Florida lived until October 14th. He remained healthy until the end, and I am assuming that he was already quite old by then, maybe even two months older than the mantids found in the wild in New Jersey. Though there are no more sightings of mantids in the town I work in, I do see *Tenodera aridifolia sinensis* both in my garden and in various gardens around town.

**Introduction of mantids into my garden.**

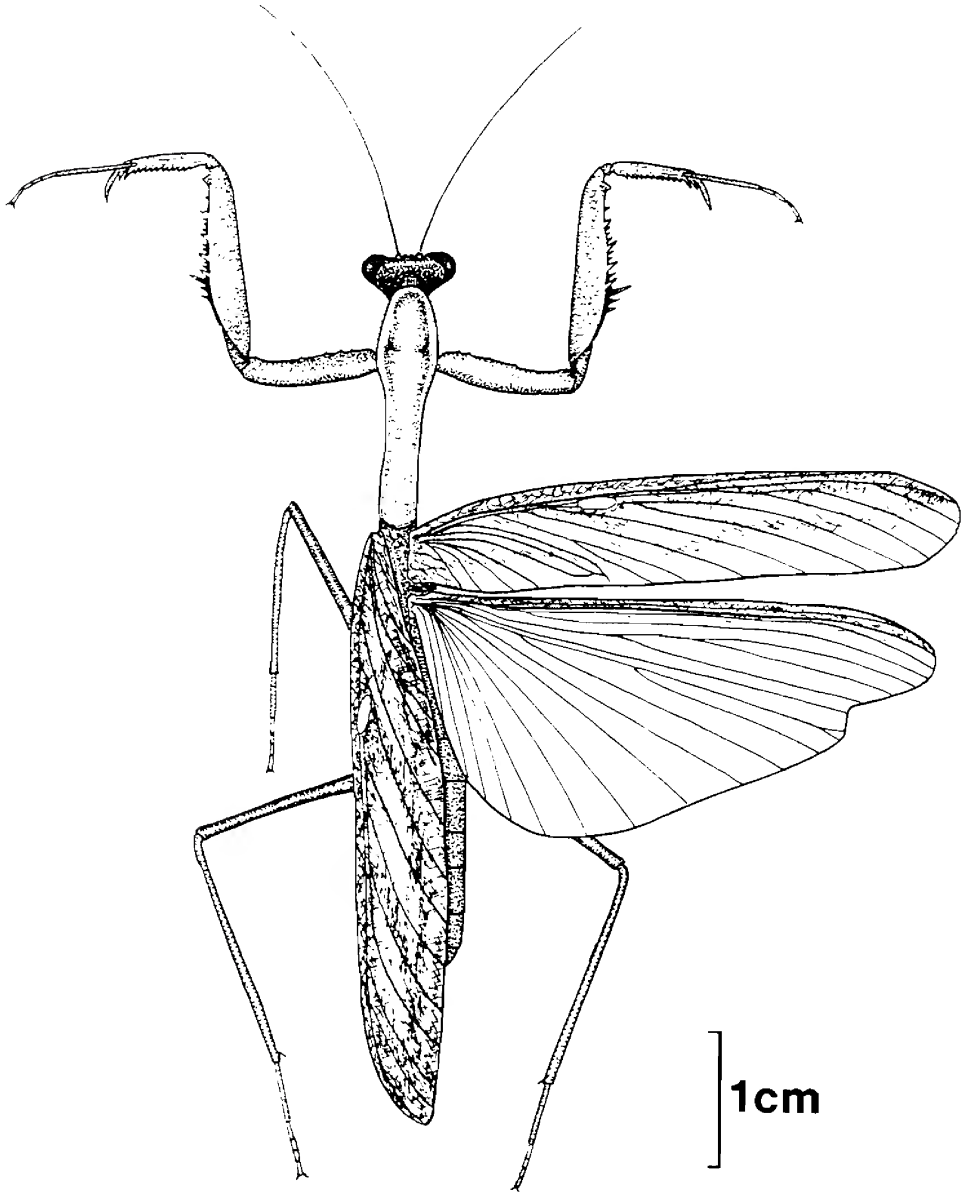
In the spring, I put two *Tenodera aridifolia sinensis* and two *T. angustipennis* egg cases in my garden. This is the first year in which this small garden is dense enough to possibly support a small mantis population. Later in the spring, I added three more egg cases that were given to me by the person I met on the internet who had found 250 egg cases. I placed more all over the town I live in, including right in the dune grass along the beach. The nymphs hatched on June 7th, and the small garden was full of them. The entire garden, which is between my house and the neighbour's, is only 3m feet wide and 15m long, but that includes the path and the patio in the back. Only about 25% of the garden gets a decent amount of sun, so the only part, toward the back, that mantids will live in is about 2.5m by 4m. There is a large butterfly bush, a flowering spirea shrub, various perennial flowers, and a very dense clematis vine that covers the entire fence in back, 2m high and 3m long. This flowers in September. The nymphs were visible throughout June and July, with a noticeable drop in numbers by July. Once they got large enough, they ate mostly flies that were numerous in the garden. The usually noticeable grasshopper population that I see every year in the garden became almost non-existent, probably due to the mantids. By late July and early August, there were a few that had only one or two moults left. There appeared to about two dozen individuals left by this time, and I could, at least somewhat, keep track of those that were left. Every week there were more losses - either from cannibalism or predation by birds or cats, I do not know. Individuals that were observed to be in the same spot for a week or more, many of which I was sure were going to make it to adulthood, would mysteriously disappear. Finally, the first few adults emerged on August 12, and more followed during the next week. There were four or five females, about the same number of males, and several sub-adult nymphs. Not all of the sub-adults made it. A few disappeared as well. The food they were eating by this time was mostly bees and butterflies. The most common visitor to the butterfly bush was the monarch butterfly. Sometimes as many as five would come at one time, and stay most of the day. Unfortunately for them, a mantis would catch one every so often. I could see the wings of various butterfly species on the ground below the butterfly bush. When one particular green female became an adult near the end of August, she had a particular strong taste for monarchs, and would eat two or three each day. I tried to move her out of the butterfly bush and put her in the clematis vine, but she went right back there the next day. I observed her hunting on one hot Saturday morning at the end of August. She already finished eating one monarch - there was a new set of wings on the ground - when another monarch that had been there for some time landed right in front of her. She struck immediately, and quickly subdued the struggling butterfly. Another green female, about 60cm away from here, ignored most of the monarchs. She did not seem very interested in them. The other one ate another monarch about two hours later, and an

interesting thing happened. She appeared to be full for now, because any other monarch that came, even ones that landed right in front of her, was ignored. For the rest of the day, many came and went, and all were safe - the mantis ignored all of them. The next day, apparently hungry again, she ate two more.

About two weeks after the first one became an adult, I took that one inside, a green female, along with a male. At this time there were several adults and a few sub-adults in the garden, maybe about a dozen. There were three brown females, a green one, and a few adult males, mostly on the butterfly bush. As I did work in the house one Sunday afternoon, every so often I would look out the window, and I would see the mantids perched right on top of the butterfly bush. Several times during that hot, but cloudy day, I took a quick look, and they were in the same place all day. Then, at about 1600, about a half hour after I last saw them, I looked out the window and did not see any of the brown females. I walked out into the garden, and saw what happened. Something had just eaten the three brown females and a male, only a few minutes before, all at once. The wings were on the ground right below the butterfly bush. The green one that was eating the monarchs was still there, and so were a few males and some sub-adults, but the best adult females and a large male were gone all at once. It must have been some large bird, such as a crow, that quickly came and went. I never actually saw the bird. I can't imagine that a small bird would even be able to eat this many all at once, so it must have ben something like a crow, which I do see occasionally, but not usually in the garden. The rate of losses after this dropped, and the remaining mantids in the garden all reached adulthood, about six or seven of them. The first egg cases appeared in September, when I came back from Florida. There are at least four egg cases there now, in both the clematis vine and the butterfly bush. *Tenodera angustipennis* were another story. They hatched later, and the survival was very low, possibly because of predation by the other species, which was considerably larger by the time *T. angustipennis* hatched. I saw only two sub-adults in August, and took both inside. These soon moulted into adult males, in early September. I could not find even one female of this species this year. By the third week in October, there was not a single mantis left in my garden, either due to predators, or they may have left the garden and went over the fence to where there is sun all day.

I continued to see *Tenodera aridifolia sinensis* females in gardens near the beach throughout the end of October and all of November. These are the same gardens I find the last survivors in every year. There were also a few here and there in the dune grass right along the beach. I took in quite a few during November, and each made at least one egg case. There was only one rather cold week that month, but there was no frost near the ocean, and the last two weeks of the month were warmer than usual. Inland, where the frost comes earlier, there were no more mantids by early November. I found the last mantis of the season in one of those seaside gardens on November 27th, a brown female that walked about 8m away from the evergreen shrub that she was on the week before, across a lawn, and onto a chain link fence right near the sidewalk. She was very lucky that a bird or cat did not notice her during what must have been quite a long walk. I found her there on that unusually warm afternoon, and took her home. She ate, made her last egg case, and died two days later. By December 1st, the weather got really cold, there was a heavy frost overnight even near the ocean, and the last-but-one mantis season of the millennium is over. Several captive females remain, plus one male, and a male *Tenodera angustipennis*. All the *Mantis religiosa* captive females died very early this year, throughout October, and by early November all the captive females had died, after making only two egg cases each. The males died shortly afterwards. But there are egg cases of *Tenodera aridifolia sinensis* visible now in various

gardens as I walk around my town, and the beginning of the second century of mantids in New Jersey is assured.




*Sphodromantis trimacula*, drawing by Phil Bragg.

**Mantis communication** — Andy Lasebny.

This is a response to the article in *MSG Newsletter* 11:2, about mantis communication. I also have observed what appears to be communication, at least between males and females when they are about to mate. Recently, I tried to get a pair of *Creobroter gemmatus* to mate. I placed the male in a medium sized cage with twigs in it. I put the female inside with him, and he seemed interested at first, but he never approached her close enough. He remained about 8cm behind her, and just kept staring at her. She ignored him completely. After about two hours, I gave up on them, removed the female from the cage, and went to bed. The next day, during the afternoon, I put the female back in. The male was near the top of the cage, near one corner. I put the female near him, and coaxed her to walk toward him. He tensed up a bit, and turned his head slightly and looked at her as she slowly walked by. Though he barely moved, the female did something very interesting, similar to what I observed on one occasion last year. She looked at him right in the face, and began to do a slow and graceful "dance", almost like tai-chi. She kept her head in the same position throughout, directly facing the male. She slowly stretched out her forelegs, sometimes at the same time, sometimes alternately, one at a time, and folded them slowly, over and over. While she did this, she also turned her body to the side as her head remained fixed in the same position. She turned her body sideways toward him to the right, waved her forelegs to the right, perpendicular to him, then slowly and gracefully turned around to the left and waved her forelegs again, toward the left this time, while her head remained in the exact same position, staring right at him. She kept doing this over and over, very slowly and evenly, with near perfect symmetry. Occasionally she lifted her wings up very slightly, and put them back down as she did the "dance". This went on for at least a half an hour, and the male's response was to just stare at her and do nothing at all. After about a half an hour, she stopped doing this, relaxed, and turned around facing away from the male. She just sat there for about 15 minutes. I left the room. When I came back in about another half an hour, the pair were mating. They stayed together until late evening, and the male was fine. I took him out, and fed both of them.

Female *Tenodera* of both species that are found here, do something a little different, and far less elaborate. When the male jumps on her back, she stretches out her forelegs straight out in front of her, as if she is letting the male know that she will not attack him. Since the ready-to-attack position is with forelegs folded and ready to strike, I suppose that the opposite posture shows the male that all is safe. Did anyone else observe this? Sometimes the male does a "dance" - he waves his abdomen side to side slowly as he approaches the female, though I have not seen any do this in the last few years. I did see males do this occasionally when I kept mantids during my childhood.

*Mantis religiosa* do not appear to do anything - the female barely reacts at all when a male jumps on her back, though frequently the male lands on her back facing the wrong way, then turns around after a few minutes. Is this a way to protect his head? Is he testing her out? I have no idea if this is even intentional or just a mistake on his part.

## Notes on *Creobroter* — Andrew Smith.

These notes were spawned by Allan Stubbs' excellent observations on the *Creobroter* mantis that he keeps (see *MSG Newsletter* 14:2). My observations tie in closely with his. Oothecae take 4-5 weeks to hatch at 20°C night and 25°C day temperatures with a 13 hour day. Nymphs take 3-4 months to mature. Adult males live 3-4 months, sometimes more. A restricted diet can extend their life expectancy. Adult females can live 7-8 months or more so three generations can exist at the same time.

While it is rare for a female to eat the male before mating it is necessary to remove the male from the breeding cage after mating as she will catch him at the first pang of hunger.

When trying to get them to mate I position the female in the cage so that I can introduce the male from behind. I often resort to distracting the female with food or a thin twig in front of her. This allows the male to approach unseen until he can make his "frantic leap", although often he can just walk on. Successful fertilization can result from a short mating but it can last many hours.

I often get oothecae made on the frame of the cage and have found you can remove them from fairly smooth surfaces by carefully prising the ends away with a finger nail after waiting a few days to allow hardening. Oothecae can be *Blue Tacked* into a plastic cup or other container to await hatching. At 60-70% humidity oothecae will hatch without additional moisture but more does no harm is there is an air flow to prevent mould. Like Alan Stubbs I have had 42 nymphs from several oothecae but also more than 50 and as few as eight. The size of the ootheca is not always an indication of how many nymphs will emerge but bigger oothecae normally produce more nymphs.

If nymphs are kept together, the more room they have the less cannibalism occurs. This is most common in the later instars and is often caused when two nymphs are close together and one is startled by something and instinctively strikes out. One may catch a fly and another catch them both in the blink of an eye.If the captured one does not get free immediately a form of apathy seems to set in and the victim gets eaten with little struggle. When I have kept a hatching of nymphs together for their whole development without interfering I have had more than 25% reach adult in a large cage with constant excess food. This figure can be improved if you remove the odd early developers or any which get left behind developmentally and keep them with their own size group. With care I have had up to 60% reaching adult. Similar levels are achieved when keeping mantids individually.

Some oothecae produce a healthier bunch of nymphs than others. Several times I have found nymphs that seem to specialize in cannibalism. Eating one sibling by accident is one thing but one a day is cannibalism.

Nymphs and adults drink water readily and seem to need more water than their prey provides unlike some species such as *Sphodromantis lineola* that rarely drink if kept in humid conditions. Young nymphs have little mass and dry out quickly and many die whilst shedding if not given sufficient moisture. Like Alan Stubbs I have found *Creobroter "meleagris"* to be a strong, lively, fertile species that is easy to keep and pleasing to look at.

## Coexistence of two mantis species — Andy Lasebny.

The following is a response to the article by Karl Kral, concerning coexistence of two mantis species in the wild (*MSG Newsletter* 11: 8-10). This was a very informative and interesting article, and is also very useful, since it tells me what is the best time of year to go to that part of the world if I want to find the species he mentions. I wish more members would do a similar study for other parts of the world.

While the coexistence of *Mantis religiosa* and *Empusa fasciata* in their natural habitat seems to be relatively easily explained, with the very different times they mature, and different parts of the habitat in which they live. What he says about his observations makes sense. However, what goes on here in New Jersey, is more difficult to explain. Not only are all three species that exist here not native, and were here only for the last 100 years, but I doubt that all three ever occurred together naturally anywhere else. While *Tenodera aridifolia sinensis* and *Tenodera angustipennis* probably do coexist in their original Asian habitat, I doubt that *Mantis religiosa* was there as well. Not only that, but unlike that European habitat, which is apparently warm enough year round so that *Empusa* overwinters as a nymph and becomes an adult in May, New Jersey has "tropical" summers and "arctic" winters, and mantis season is quite short. The order of adult emergence is that of *Mantis religiosa* becoming adults first, end of July and beginning of August, *T. sinensis* mid August, and *T. angustipennis* and of August and beginning of September. I suppose that *M. religiosa* becoming an adult first prevents *T. sinensis* from eating too many of them, since the still young *T. sinensis* are relatively similar in size to *M. religiosa*, since the larger *T. sinensis* does not hatch until *M. religiosa* had a few weeks to grow. But then how does the medium sized *T. angustipennis* fit into all this? I would imagine that a lot of *T. angustipennis* nymphs would be eaten by the already adult *T. sinensis*. When seeing these species in the wild, and in cultivated gardens, both appear to live in more or less the same type of areas, flowering meadows and evergreen shrubs. And when they come to the urban areas at night, I find either species in the same places, right in the middle of a wall or window, seldom trying to hide. *Mantis religiosa*, on the other hand, I almost never see in natural areas, and when they come to urban areas they usually hide under things, like window sills, or any part of a wall that projects out from the face of a building. Maybe the reason I do not see them in wild areas is because they do not go to the tops of vegetation as frequently. Maybe they remain hidden in dense grass near the ground, I do not know. According to Karl Kral's observations in Europe, that does seem to be the case. The other two species are easy to find in gardens. All I have to do is look during the late morning and early afternoon on a hot, sunny day. Most individuals come out to the top of vegetation then. I have seen the same thing in meadows - if I stand along the edge long enough on a sunny day, and look around near the tops of the plants, I can usually spot a few of these here and there. The question is, are all three species found in the same meadows, or are there different habitats that they prefer, so they do not encounter each other as frequently? Maybe *M. religiosa* seldom go into the taller shrubs and evergreens, and since the others do, there are fewer of the larger ones close to the ground in dense grass, and encounters between *M. religiosa* and *Tenodera* are kept to a minimum. Has anyone in the USA done a study like this?

# Mantis abstracts

The following are abstracts from papers published recently, or in some cases details of the paper but without an abstract. The papers are in English unless otherwise indicated. The editor would be grateful for copies of any recently published papers so that abstracts may be included in this section of the newsletters.

**Land, M. F.** (1999) Motion and vision: Why animals move their eyes. *Journal of Comparative Physiology A Sensory Neural and Behavioral Physiology*, **185**(4): 341-352.

Nearly all animals with good vision have a repertoire of eye movements. The majority show a pattern of stable fixations with fast saccades that shift the direction of gaze. These movements may be made by the eyes themselves, or the head, or in some insects the whole body. The main reason for keeping gaze still during fixations is the need to avoid the blur that results from the long response time of the photoreceptors. Blur begins to degrade the image at a retinal velocity of about 1 receptor acceptance angle per response time. Some insects (e.g. hoverflies) stabilise their gaze much more rigidly than this rule implies, and it is suggested that the need to see the motion of small objects against a background imposes even more stringent conditions on image motion. A third reason for preventing rotational image motion is to prevent contamination of the translational flow-field, by which a moving animal can judge its heading and the distances of objects. Some animals do let their eyes rotate smoothly, and these include some heteropod molluscs, mantis shrimps and jumping spiders, all of which have narrow linear retinae which scan across the surroundings. Hymenopteran insects also rotate during orientation flights at speeds of 100-200°$s^{-1}$. This is just consistent with a blur-free image, as are the scanning speeds of the animals with linear retinae.

**Paoletti, M.G., Hu D., Marc, P., Huang N., Wu W., Han C., He J. & Cai L.** (1999) Arthropods as bioindicators in agroecosystems of Jiang Han Plain, Qianjiang City, Hubei China. *Critical Reviews in Plant Sciences*, **18**(3): 457-465.

No abstract available at present, but paper does include some work on Mantodea.

**Zubrzycki, I.Z. & Gade, G.** (1999) Conformational study on a representative member of the AKH/RPCH neuropeptide family, Emp-AKH, in the presence of SDS micelle. *European Journal of Entomology*, **96**(3): 337-340.

Emp-AKH is a member of the large adipokinetic hormone (AKH) family of peptides. This peptide family appears to occur in the corpora cardiaca of all insect species and its members are involved in regulating substrate mobilisation. The secondary structure of Emp-AKH has been studied in the presence of sodium dodecyl sulphate micelles by comparing data obtained from Nuclear Magnetic Resonance and molecular dynamics simulations. The lowest energy conformer obtained in this study has a turn consisting of residues 5-8 and a tail consisting of the first five residues. Work done with *Mantis religiosa*.